ASOS MODIFICATION NOTE 80, REVISION A (for Electronics Technicians)
Maintenance, Logistics and Acquisition Division
W/OPS12: AL/MJW

SUBJECT:	FIRMWARE upgrade for the Automated Surface Observing System (ASOS) Acquisition Control Unit (ACU) processor board (S100-1A2A1-2) or Single Cabinet ASOS (SCA) processor board (S100-1A2A1-3)
PURPOSE:	Instructions for upgrading the FIRMWARE on the ASOS processor board.
EQUIPMENT AFFECTED:	ASOS ACU or SCA
PARTS REQUIRED:	Ethernet cable, RJ-45 to RJ-45 CAT 5 patch crossover (ASN: S100-TE310) Serial RS-232 cable, DB-9 to RJ-45 (ASN: S100-TE311) Software, ProComm Version 4.7 (ASN: S100-TE318-2)
SPECIAL TOOLS REQUIRED:	Laptop computer with: CD-ROM Ethernet Network Interface
FILES REQUIRED:	SolarWinds 2000 Standard Edition (TFTP Software) Procomm Plus (See Maintenance Note 52 for the installation procedure.) asos0800.hex (Firmware file name for all versions, version is identified by date modified) script.wax (Procomm Plus Executable file) script.was (Procomm Plus Aspect file) Flash CPU.key (Procomm Plus file)
MODIFICATION PROCUREMENT:	ASOS Firmware is available on the ASOS Technicians Home page at: http://www.ops1.nws.noaa.gov/asos/cpu_firmware.htm
ESTIMATED TIME REQUIRED:	2 hours on site
EFFECT ON OTHER INSTRUCTIONS:	None
AUTHORIZATION:	This modification is authorized by Engineering Change Proposal **S01141**.
VERIFICATION STATEMENT:	This modification has been tested for operational integrity and verified at the National Weather Service (NWS) Headquarters, Silver Spring, Maryland (SP2).
SPECIAL INSTRUCTIONS:	Refer to Modification Note 73 Revision C: 1) Page 7, Part 1- Step 3 for proper fuse installation; 2) Page 13, Part 6 for shipping instructions, if required. Return all unused boards to NLSC.

GENERAL:

It is strongly recommended to successfully execute this procedure at a local site prior to attempting installation at a site requiring long distance travel.

This modification note provides a procedure to load the ASOS FIRMWARE onto the new processor from a laptop. It assumes that the new ASOS CPU (P/N S100-1A2A1-2 or S100-1A2A1-3) has already been installed. If the CPU has not been installed, see Modification Note 73.

Procomm Plus is used to interface with the ASOS CPU. A Procomm Plus script file sets up the CPU and loads the new firmware. The SolarWinds 2000 Standard Edition program is loaded onto the laptop and used to transfer the new ASOS firmware from the laptop to the ASOS CPU over the Ethernet port on the CPU.

Preparing the laptop correctly is critical to successfully completing this modification. Various Microsoft Operating Systems interface differently with the programs required. Many options within the various operating systems could inhibit successful completion of the Mod Note. Pay particular attention to the IP address set up.

Consult the local ESA to ensure proper laptop configuration.

PART 1 – PREPARING THE LAPTOP

This part should be done prior to traveling to an ASOS site.

Continue to PART 2 if the laptop has already been configured according to this procedure.

Software Installation:

1. Procomm Plus 4.7 must be installed on the laptop. To install Procomm Plus 4.7, see Maintenance Note 52.
2. Use the procedure in Attachment C to install the SolarWinds 2000 Standard Edition Program on the laptop.
3. Copy file: "**script.was**" & "**script.wax**" to C:\Program Files\ProComm Plus\Aspect. Copy file: "**Flash CPU.key**" to the ProComm folder on the laptop (usually C:\Program Files\ProComm Plus).
4. Copy the ASOS firmware file: "**asos0800.hex**" to **C:** (root directory on the C: drive) on the laptop. This file is the same name for all firmware versions, only the "modified date" changes. **Pay close attention to the "Modified Date" of the file to be loaded.**

Procomm Plus Setup:

5. From the desktop:
   a. Select START>>Programs >>ProComm Plus>>Data Terminal.
   b. Select OPTIONS>>META Key Editor.
   c. Select OPEN and choose FLASH CPU.key as the META Key file.
   d. Select OPEN and then select OK.
   e. Select VIEW and META Keys from the pull-down menu. The following buttons display at the bottom of the ProComm screen:

      SW_TFTP Memory 0 VERIFY 0

NOTE: "**SW-TFTP**" is the executable file for the SolarWinds 2000 Standard Edition Program.

"**Memory 0**" is a direct command to the processor that fills the memory between hex addresses f0800000 and f0b00000 with zeros (0). This clears the battery backed NVRAM.

"**VERIFY 0**" is a direct command to the processor displaying the first block of memory. It indicates that the memory has been cleared when the result is all "0."

   f. Select **Options**>>**System Options**>>**Modem Connection**>> **Current Modem/Connection** = direct connect-Com1.

g. Select **Modem/Connection Properties** and set the Port Settings as follows:

Bits per second:	**9600**
Data bits:	**8**
Parity:	**None**
Stop bits:	**1**
Flow control:	**None**

h. Select **OK** to exit.

SolarWinds 2000 Standard Edition Program Setup:

6. Check the ASOS FIRMWARE file location in the SolarWinds program under **File>>Configure** as **asos0800.hex** in the file window of the **C:** directory.

7. Set the IP address range in the SolarWinds program

   a. Under the Security tab select:
      Transmit and Receive files

   b. Under the Advanced Security tab, Permitted IP Addresses window:
      Add New Address Range
      Enter:
      From: 207.233.234.1 To: 207.233.234.254

   c. Select **Add New Range**.

   d. Select **OK.**

Network Interface Card Setup:

8. Appendix A shows an example of a typical Network Interface card setup. Your Network Interface card could have a different setup. Consult your local ESA to confirm the setup procedure for your laptop hardware.

PART 2 – BEFORE INSTALLATION OF PROCESSOR FIRMWARE UPGRADE

1. Call the ASOS Operations and Monitoring Center (AOMC) at 1-800-242-8194 to provide the SID of the ASOS on which you will be installing the CPU FIRMWARE upgrade. Confirm with the AOMC that the site-specific data base is available, then upload the current configuration before proceeding with the Processor FIRMWARE upgrade.

2. Get approval of the responsible MIC/OIC/Observer before starting installation. Installation of the Processor FIRMWARE upgrade may be performed on any day of the month if restrictions in steps 3 and 4 are satisfied.

3. Download the following data sets to the laptop using the direct command mode as outlined in Section 1.3.14.2, of the Site Technical Manual:

Data Set	**File Naming Convention**
5MIN	FMMDDdd.STA
OBS	HMMDDdd.STA
SYSLOG	SMMDDdd.STA
DAILY	DMMDDdd.STA
SHEF	YMMDDdd.STA
ARC5MIN*	ZMMDDdd.STA
MM = Month of data DD = Beginning day of data dd = End day of data STA = 3 letter station identification (i.e., Witcha Falls, TX = SPS) * = 1, 2, or 3 (file will not exist if archive data had not been previously saved). Forward collected data to the responsible DAPM as soon as possible.	

4. Do not start installation during inclement weather, precipitation, instrument flight rule conditions, or if any of those conditions are expected within 3 hours. The responsible MIC/OIC/Observer will define these meteorological conditions.
5. Do not begin the CPU FIRMWARE upgrade at a time that conflicts with scheduled synoptic observations at 00, 03, 06, 09, 12, 15, 18, and 21Z. Although one and a half hours should be sufficient, allow two hours to complete installation and restart ASOS.
6. Immediately before beginning work at NWS staffed sites, the MIC/OIC/Observer will inform the tower and any other critical users that the ASOS will be turned off for the CPU FIRMWARE upgrade. At unstaffed sites, the electronic technician (ET) will inform the tower using controller video displays (CVD) and OID to log off and shut down the displays to avoid problems.
7. Do not begin the installation process until immediately after an hourly observation has been transmitted. At NWS-staffed sites, normal backup observing procedures will be implemented.
8. Sites without a local OID (i.e., no RS232 connected for the primary OID) must attach a terminal to the primary OID port 1A9J22 before proceeding.

9. Use the following steps and upload the current system configuration to the AOMC.

CAUTION

Be sure to complete step "d" in the following procedure as soon as possible after step "c." DO NOT upload the communications change made in step "c" to the AOMC.

a. Log on as TECH.

b. Proceed to the AOMC page (**REVUE-SITE-VERSN-AOMC**). Command an upload of all data files except VOICE AIRPORT NAME. Wait for all of the lines to change from "UPLOAD REQ" to "COMPLETE." When complete, key **Exit**.

NOTE: DO NOT disable the local OID in step c.

c. Proceed to the COMMS page **(REVUE-SITE-CONFG-COMMS**) and disable all hardware and communication ports. When complete, key **Exit**.

d. Proceed to the AOMC page (**REVUE-SITE-VERSN-AOMC**) and cancel the automatic update of the RS-232 com started by the configuration changes made in step c. When complete, key **Exit**.

PART 3 – PROCEDURE FOR INSTALLING THE PROCESSOR FIRMWARE

NOTE: This procedure requires that the laptop computer have an Ethernet port.

1. Power-down the ACU.
2. Verify that only one CPU is in the system. If two CPUs are present, configure IAW ASOS Modification Note 73.
3. Verify that the "config" number on the back of the CPU ends with "C1" for an SCA installation or a "B1" for an ACU installation.
4. Record the serial number of the processor board and include it in the Engineering Management Reporting System (EMRS) report (see page 11, Part 5).
5. Insert the CPU then power-up the ACU.
6. Connect the DB-9 to RJ-45 serial cable (S100-TE311) between COM1 on the laptop computer and the SERIAL (*upper*) connector on front of the processor board.
7. Connect the RJ-45 to RJ-45 (S100-TE310) Ethernet crossover cable to the Ethernet adapter connector on the laptop computer and to the Ethernet (*lower*) connector on front of the processor board.
8. On the laptop from the Windows Desktop select **START**>>**Programs**>>**ProComm Plus**>>**Data Terminal**

9. Verify that ProComm Plus is configured for "direct connect-Com1" and 9600 bps on the Quick Select Line
   View>>**Quick Select Line**

10. Start the SolarWinds program.
    Select META Key in ProComm **SW-TFTP**

11. In the ProComm Plus Program window **Script file:** menu select:
    script
    This initiates the script file that programs the CPU

12. Flip the RESET switch on the processor board to the **RIGHT**. The laptop display should indicate that the processor is being programmed.

13. Programming should take a few minutes. When programming completes, the following displays (see figure 1):

O.K. to reboot now

(If this message does not display the board may have some other problem.)

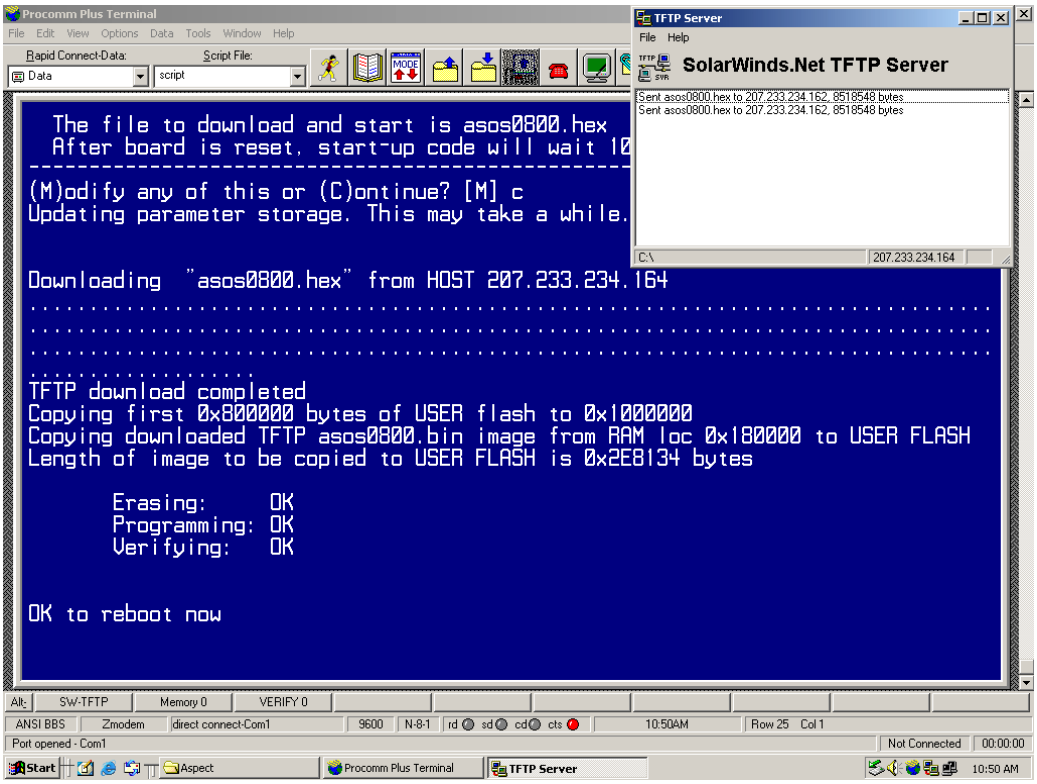


Figure 1

14. Verify that the correct firmware loaded:

    Length of image to be copied to USER FLASH is 0x2E8134 bytes.
    "0x2E8134" is correct for version 2.7B-6. This is different for each version. The number of 'bytes' displayed in SolarWinds is also different for other firmware versions.

    Notify ASOS Maintenance Branch (W/OPS12 @ 301-713-1833 extension 120) if the User Flash does not agree with the version documentation.

15. Flip the switch on the processor to the **LEFT**.

16. The Processor issues a **pROBE+>** prompt.

    Select META Key in ProComm **Memory 0**

    (OR t*ype* ***fm<space>f0800000..f0b00000<space>0<enter>***.)

    This command fills the processor memory with zeros (0) between hexadecimal addresses f0800000 and f0b00000. This step clears the memory locations were the site specific data is stored on the processor.

17. The processor issues a **pROBE+>** prompt.

    Select META Key in ProComm **VERIFY 0**

    (OR type **dm<space>f0800000<enter>**.)

This command is issued to verify that the command clearing the memory was successful and instructs the CPU to display the first memory block. It is a good indicator that the entire memory has been cleared. The CPU returns all zeros for the following memory locations:

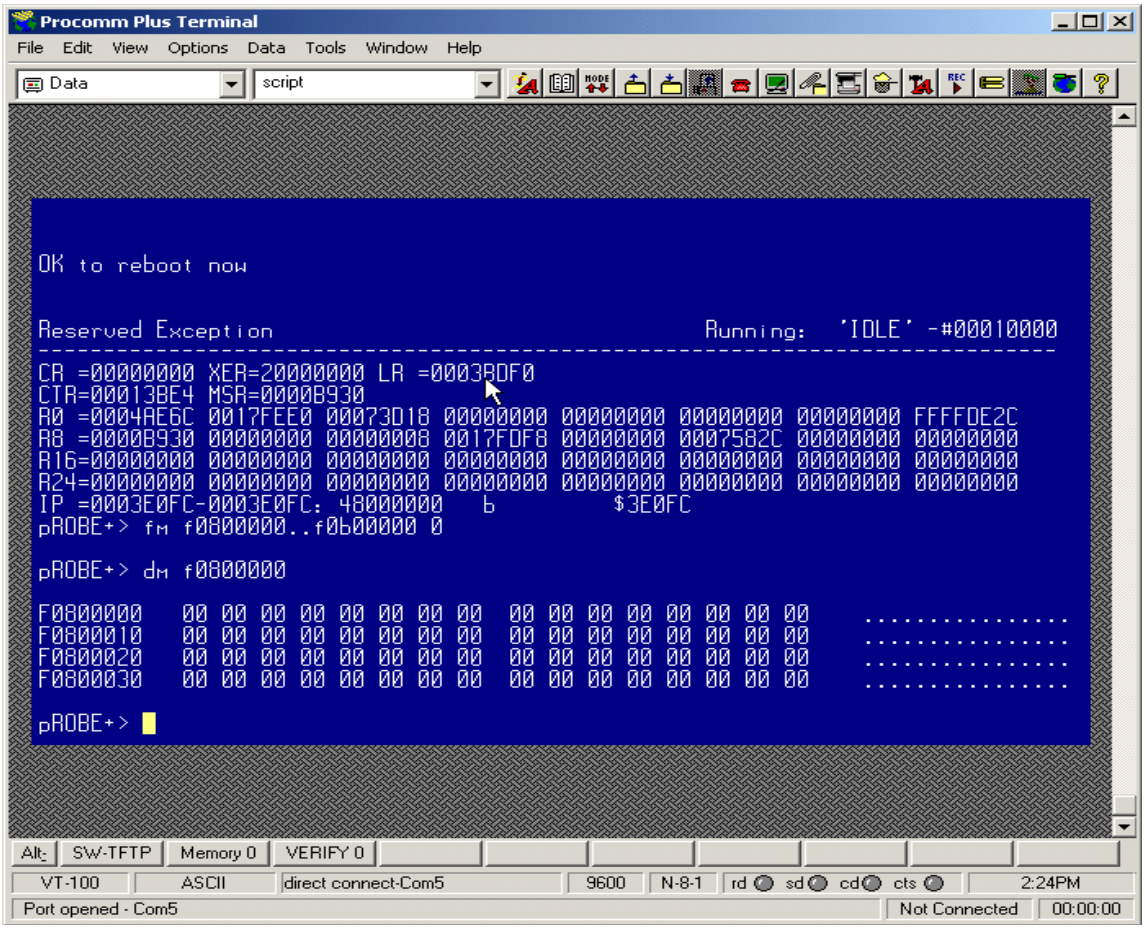


Figure 2

18. After the processor issues the **pROBE+>** prompt, disconnect the RJ-45 serial cable and the Ethernet cable from the CPU.

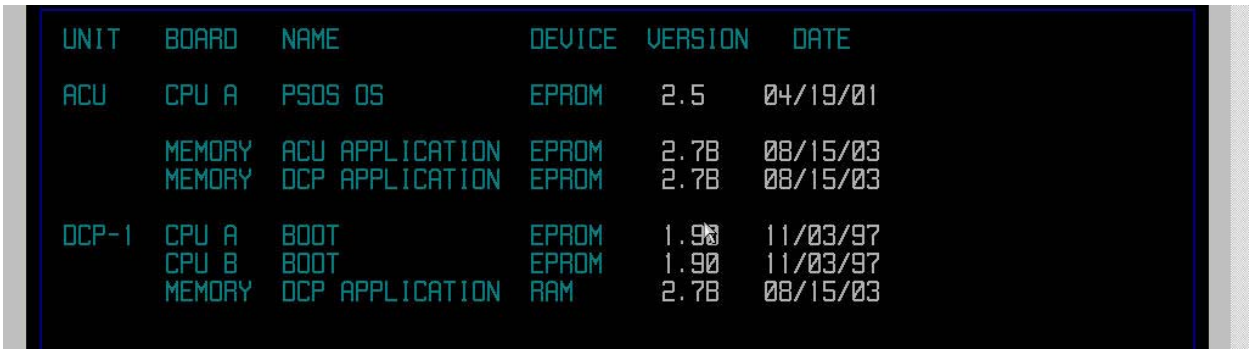
19. Flip the switch on the processor to the **RIGHT** to RESET. This completes the FIRMWARE upgrade.

Modification Note 81

20. IF for any reason installation of the FIRMWARE fails or causes a conflict with the site specific configuration, install the previous version of FIRMWARE following steps 6-19. In this instance, the Modification Note will be documented as **81**.

PART 4 – AFTER INSTALLATION OF FIRMWARE UPGRADE

1. At the OID, logon as Technician.
   a. Enter the SID on the Site Physical Page (**REVUE-SITE-PHYS**)
   b. Enter the AOMC 800 phone numbers on the Site External Page (**REVUE-SITE-CONFG-EXTRN**). AOMC Primary Number: 800-253-4717; AOMC Secondary Number: 800-434-1133
   c. Request a complete AOMC download on the Site AOMC Page (**REVUE-SITE-VERSION-AOMC**). At the Site AOMC page, validate/verify that all downloads are complete before moving to Step 2.
2. After the download is complete, return to the OID and perform the following:
   a. Sign on as technician.
   b. The DCP download of application software should occur automatically. If not, download the DCP application software using (**MAINT-PROC-DCP**) **Hard Reset**. At the top of the screen, look for "% DOWNLOADED is displayed." Wait for the DCP download to complete. Press **Exit**.
   c. After DOWNLOAD is complete proceed to the software version page (**REVUE-SITE-VERSN-SW**) and verify the proper versions for all system software. (It may take 5-10 minutes for the information to be returned from the DCP.) See figure 3.



UNIT	BOARD	NAME	DEVICE	VERSION	DATE
ACU	CPU A	PSOS OS	EPROM	2.5	04/19/01
	MEMORY	ACU APPLICATION	EPROM	2.7B	08/15/03
	MEMORY	DCP APPLICATION	EPROM	2.7B	08/15/03
DCP-1	CPU A	BOOT	EPROM	1.9[illegible]	11/03/97
	CPU B	BOOT	EPROM	1.90	11/03/97
	MEMORY	DCP APPLICATION	RAM	2.7B	08/15/03

Figure 3

   d. Write down the Memory ACU Application VERSION AND DATE. This information will be used on the EMRS report on Page 11, Part 5, Blocks 17c and 17e.
   e. Press **Exit**.
3. After the modification has been completed, clear any maintenance flags that occurred due to the restart.

NOTE: The operator **must** turn on report processing with this version of software.

4. Proceed to the report processing control page (**REVUE-SENSR-STAT-PROC**). If applicable to the site, turn on **Report Processing** for ALDARS. If a single-site lightning detection sensor is installed, turn on **Report Processing** for thunderstorm.
5. Turn on report processing for each sensor. Press **Exit**.
6. When ASOS is restarted at unstaffed sites, call to inform towers using CVDs and OIDs to turn on their displays. (At staffed sites, the MIC/OIC/Observer will call the tower.)
7. If on-site, NWS-staff provides backup while the installation is underway. No special observation is needed when ASOS is restarted.
8. If there is no backup at a site and a record observation was missed during the installation, a special observation must be taken when ASOS is restarted. The ET should sign on the system as an observer and transmit a special observation from the "generate special page" (**GENOB-SPEC-XMIT**).
9. Logoff the system and leave ASOS running.

NOTE: The observer must sign off before the 5-minute edit time is up.

10. Inform the office staff that ASOS is operational. If less than 25 minutes remain until the next hourly observation, augmentation of the ceiling may be required. Augmenting several elements may be necessary (or even the entire observation). The chart below indicates how long it takes after a startup for ASOS to report each observation element automatically.

Times Needed for Elements to be Reported Automatically:

	Minimum	Maximum
Pressure 60 seconds	10 minutes	
Precipitation Amount	60 seconds	*
Wind direction	2 minutes	7 minutes
Wind speed	2 minutes	7 minutes
Precipitation Type	2 minutes	*
Temperature	5 minutes	10 minutes
Dew Point	5 minutes	10 minutes
Visibility 10 minutes	15 minutes	
Obstruction to Visibility	10 minutes	*
Ceiling 30 minutes	35 minutes	

* Maximum time is not applicable since weather events may not be present. Minimum time applies if weather events are present.

11. Verify the ASOS transmitted an hourly observation. Call the AOMC at 1-800-242-8194 and inform the operator of:
    a. Your location.
    b. The installation of FIRMWARE version **X.XXXX** has been completed.
    c. The ASOS is operational.
12. Sign on the system as a technician and enter in the SYSLOG that maintenance has been completed (**MAINT-ACT-FMK**). Enter the FMK number as **MOD 80**. Press **Enter**. On the second line of the screen, verify that only Mod MOD 80 is displayed. Complete by entering **Y** in the [Y/N] area if only MOD 80 is displayed. (*OR* **MOD 81**, *as appropriate*)
13. Check the SYSLOG and verify the FMK message. Enter a comment in the SYSLOG stating the new processor FIRMWARE version **X.XXXX** has been installed.
14. Before logging off the OID, proceed to the AOMC COMMS STATUS page (**REVIEW-SITE-VERSN-AOMC-UP-LD**). This commands an upload of the site configuration files to the AOMC and ensures that both parties have the same set of data files.

NOTE: If the site configuration files are not uploaded to the AOMC before the technician leaves the site, the data on file at AOMC will not match the new site configuration.

15. At an expansion site with an air traffic control tower (ATCT), the ET will contact the ATCT and supply information on the following:
    a. The ASOS maintenance has been completed.
    b. The ASOS has been restored to service.
    c. The ATCT CVDs, OIDs, and TRACON displays need to be turned on.

PART 5 – REPORTING INSTRUCTIONS

Report the completed modification using the EMRS according to the instructions in the NWS Instruction 30-2104, Maintenance Documentation, Part 4, and Appendix D. Include the following information on the EMRS report:

a. Block 7: AACU or ASCA

b. Block 8: AACU or ASCA Serial Number

c. Block 13: Processor Board ASN, Processor Board Serial Numbers (Old and New if replaced)

d. Block 17a: 80A (81A for failed installations that revert to previous FIRMWARE.)

e. Block 17c: Firmware Version (Identified on Page 8, Part 4, Step 2c.)

f. Block 17e: Firmware Date (Identified on Page 8, Part 4, Step 2c.)

A sample EMRS report is provided as attachment A.

Signature Not Verified

Mark S. Paese

Digitally signed by Mark S. Paese
DN: cn=Mark S. Paese, o=DOC/NOAA/NWS, c=US
Date: 2005.03.04 11:49:44 -05'00'

Mark S. Paese

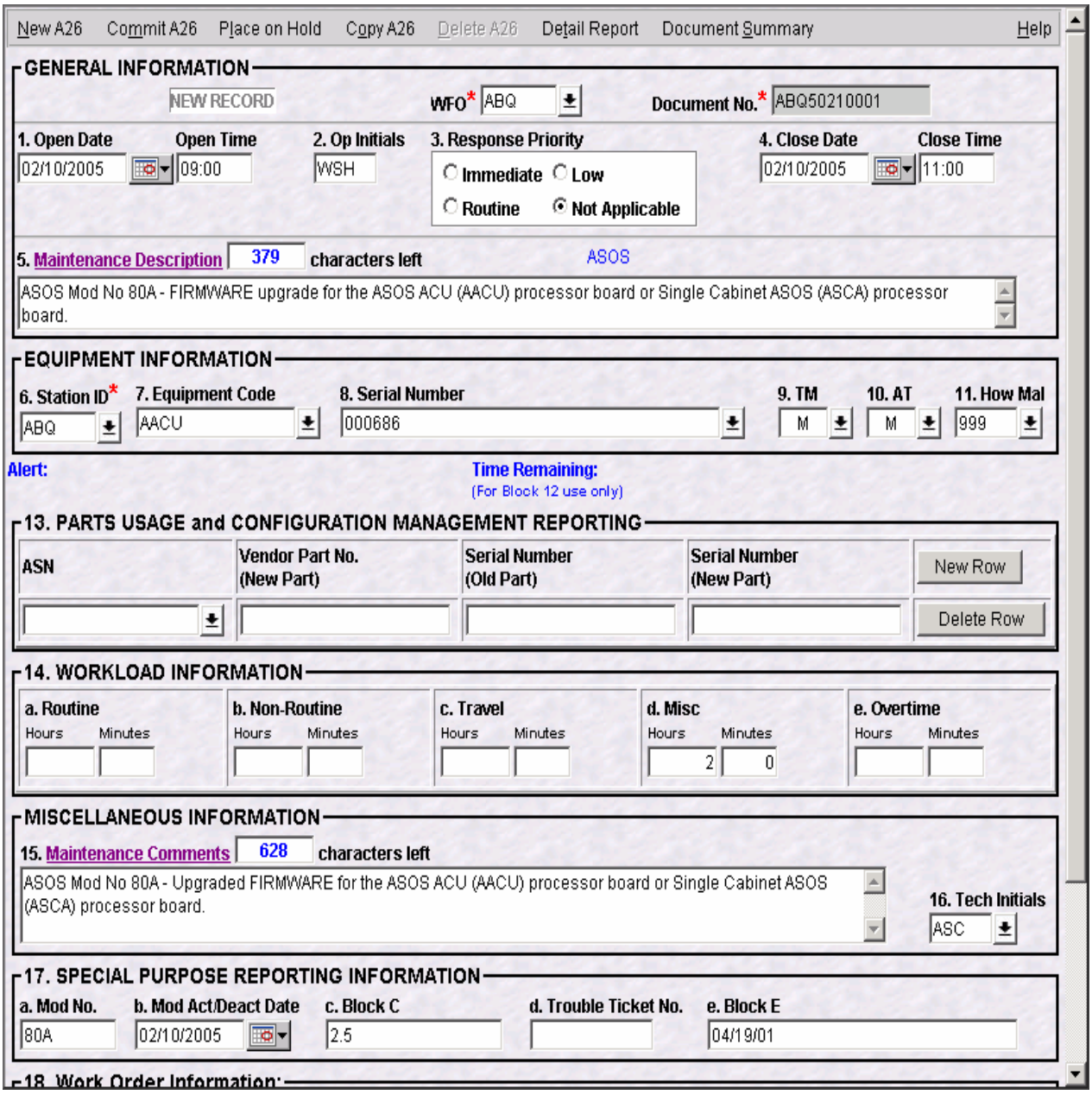
Director, Maintenance, Logistics and Acquisition Division

Attachment A Sample EMRS Report

Attachment B Example Procedure for Internet Protocol Address Configuration for Microsoft Windows 2000 Professional

Attachment C Example SolarWinds TFTP Installation Procedure for Microsoft Windows 2000 Professional

Attachment A Sample EMRS Report



New A26 Commit A26 Place on Hold Copy A26 Delete A26 Detail Report Document Summary Help

GENERAL INFORMATION

NEW RECORD WFO* ABQ Document No.* ABQ50210001

1. Open Date: 02/10/2005 Open Time: 09:00 2. Op Initials: WSH 3. Response Priority: Immediate Low Routine Not Applicable 4. Close Date: 02/10/2005 Close Time: 11:00

5. Maintenance Description 379 characters left ASOS

ASOS Mod No 80A - FIRMWARE upgrade for the ASOS ACU (AACU) processor board or Single Cabinet ASOS (ASCA) processor board.

EQUIPMENT INFORMATION

6. Station ID* ABQ 7. Equipment Code AACU 8. Serial Number 000686 9. TM M 10. AT M 11. How Mal 999

Alert: Time Remaining: (For Block 12 use only)

13. PARTS USAGE and CONFIGURATION MANAGEMENT REPORTING

ASN	Vendor Part No. (New Part)	Serial Number (Old Part)	Serial Number (New Part)	New Row / Delete Row

14. WORKLOAD INFORMATION

a. Routine		b. Non-Routine		c. Travel		d. Misc		e. Overtime	
Hours	Minutes	Hours	Minutes	Hours	Minutes	Hours	Minutes	Hours	Minutes
						2	0		

MISCELLANEOUS INFORMATION

15. Maintenance Comments 628 characters left

ASOS Mod No 80A - Upgraded FIRMWARE for the ASOS ACU (AACU) processor board or Single Cabinet ASOS (ASCA) processor board.

16. Tech Initials: ASC

17. SPECIAL PURPOSE REPORTING INFORMATION

a. Mod No. 80A b. Mod Act/Deact Date 02/10/2005 c. Block C 2.5 d. Trouble Ticket No. e. Block E 04/19/01

18. Work Order Information:

Attachment B Example Procedure for Internet Protocol Address Configuration for Microsoft Windows 2000 Professional

This procedure requires the laptop to have an Ethernet port. This example procedure for configuring the Internet Protocol (TCP/IP) properties and address identification required for the ProComm script file to interface with the *SolarWinds 2000 Standard Edition Program* and load the FIRMWARE onto the CPU. Implementation on other laptops and in other Windows operating systems will be different. Follow the individual manufacturer's instructions for ethernet adapter installation and setup.

CONFIGURING THE CORRECT TCP/IP ADDRESS IN THE WINDOWS OPERATING SYSTEM

1. From the desktop click Start, Settings, Network and Dial-up-Connections (see Figure A-1.1).

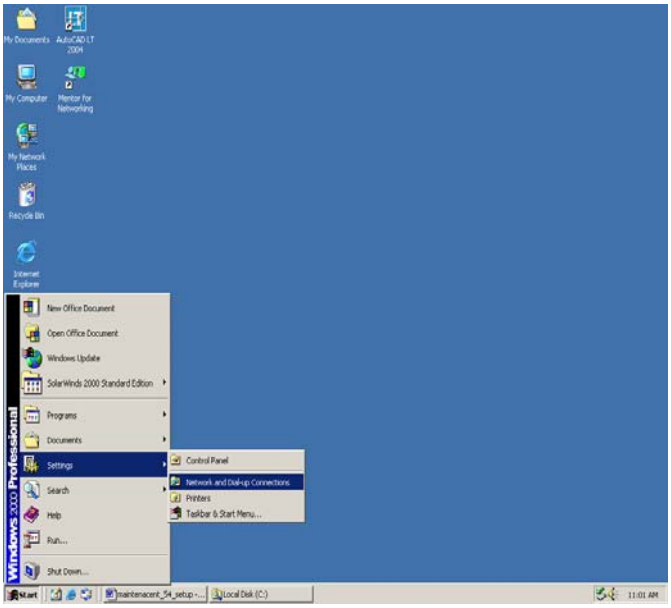


Figure A-1.1 Windows 2000 Professional Desktop

2. Double-click the icon for the **Ethernet Adapters** (see Figure A-1.2). In the example below, the adapter is manufactured by **Netgear** and is a 10 Mbps Ethernet Local Area Network interface card. Your screen, procedure, and options may be different for other Ethernet Cards. The ASOS firmware is transmitted to the CPU using this card.

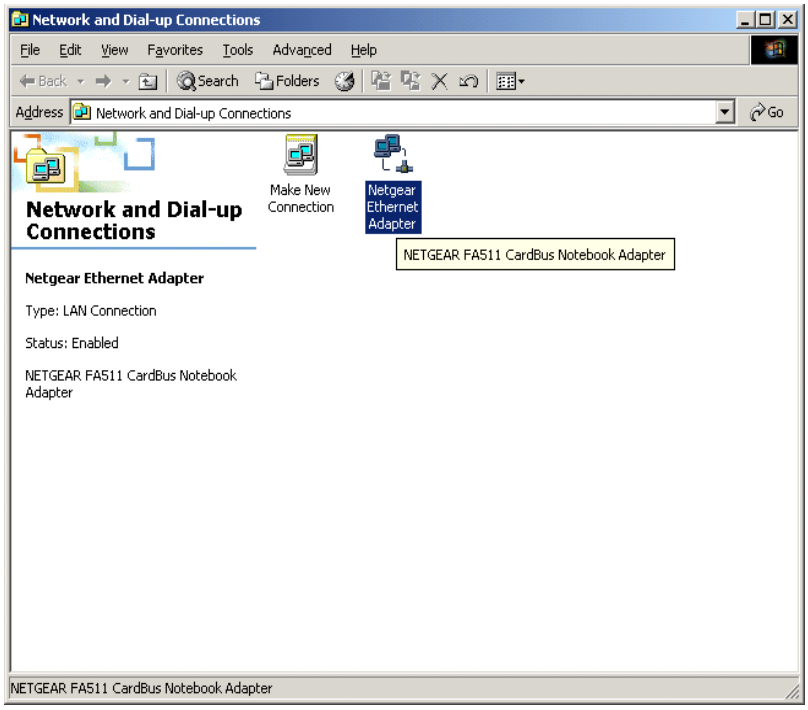


Figure A-1.2

3. Click the **Properties** button (see figure A-1.3).

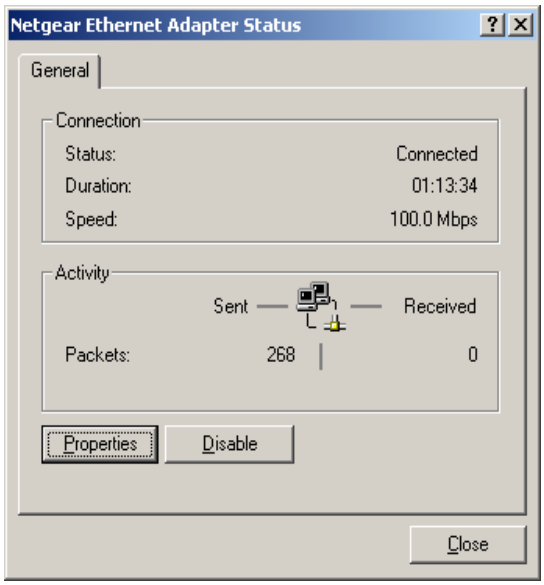


Figure A-1.3

4. Double-click the icon **Internet Protocol (TCP/IP)** (see Figure A-1.4).

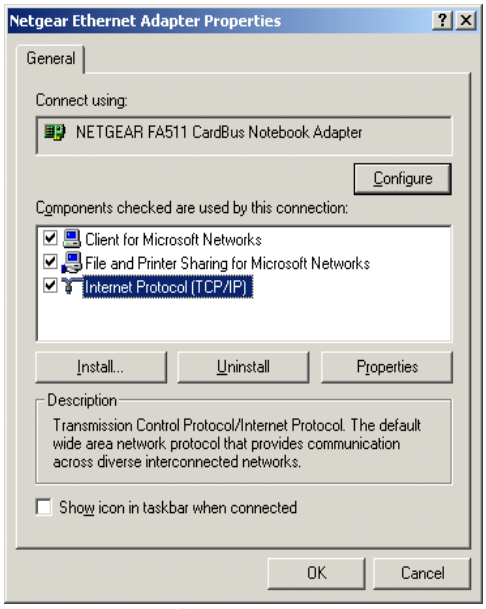


Figure A-1.4

5. Select **Use the following IP** address and type in the fields: IP address, Subnet mask, and Default gateway as shown in Figure A-1.5.

NOTE: If the laptop computer is used on a network you will need to note the existing IP address and repeat the following steps to return the laptop computer to its original configuration.

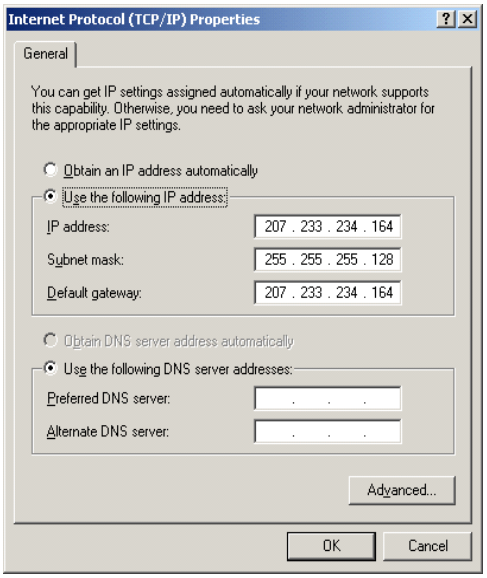


Figure A-1.5

6. Ensure the button is selected in the **Use the following DNS Server addresses** field. Leave the **Preferred DNS server:** address block empty. Leave the **Alternate DNS server:** field empty (see Figure A-1.5).

7. Select **OK**. The **Ethernet Adapter Properties** dialog box displays (see Figure A-1.6).

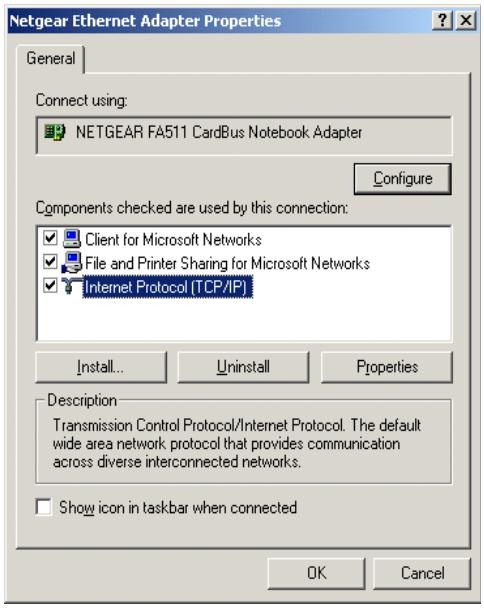


Figure A-1.6

8. Select **OK** and close the **Network and Dial-up Connections** dialog box. The Ethernet Network Interface card has been configured with the proper addressing. The ProComm script can now instruct the processor to upload the FIRMWARE from the correct IP address by interfacing with the SolarWinds 2000 Standard Edition Program.

Attachment C Example SolarWinds TFTP Installation Procedure for Microsoft Windows 2000 Professional

PART C-1 Attempt A Quick Install Using Windows Plug And Play Functionality

1. Retrieve the SolarWinds program from the ASOS Technicians Home Page.
2. Double click the **Solar Winds-TFTP-Server** icon. This initializes the Windows install wizard, guiding step by step through the installation procedure.
3. Ensure the file in the *Destination Folder* dialog box is *C:\...\Solar Winds\Standard Edition*.
4. Select **Finish** to complete the installation process.

PART C-2 Use the Windows Control Panel to Install SolarWinds TFTP Server Software

1. From the desktop Select Start, Settings, Control Panel.
2. Click Add/Remove Programs.
3. Click Add New Programs.
4. Highlight the **Solar Winds-TFTP Server** icon and click **Open**.
5. Click **Finish** to start the installation.
6. Close all other applications, click **Next** and follow the on screen instructions.
7. Click **Yes** to agree to the license.
8. Ensure the file in the *Destination Folder* dialog box is **C:\...\Solar Winds\Standard Edition**. By default, Windows stores the software package in the *Program Files* folder located on the C drive. The default destination folder path is *C:\Program Files\Solar Winds\Standard Edition*.
9. To verify the proper path, Select **Browse**.
10. Select the **SolarWinds** icon and click **OK**.
11. The *Choose Destination Location* dialog window displays again. The correct path is verified. The **Destination Folder** is **C:\...\Solarwinds\Standard Edition**. This path places three periods in the place of the file named **Program Files**.When Windows is done loading the file, Select **Finish** to complete the procedure.